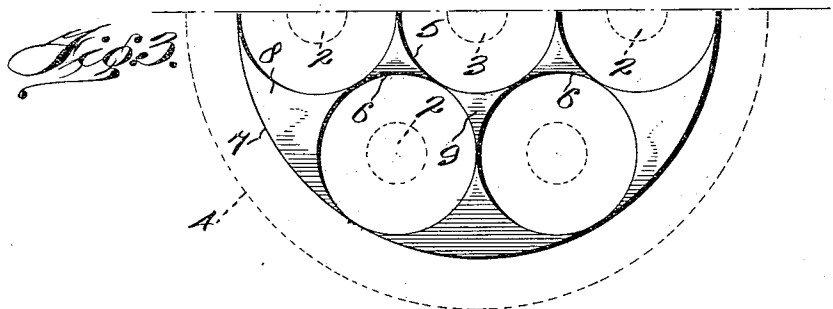
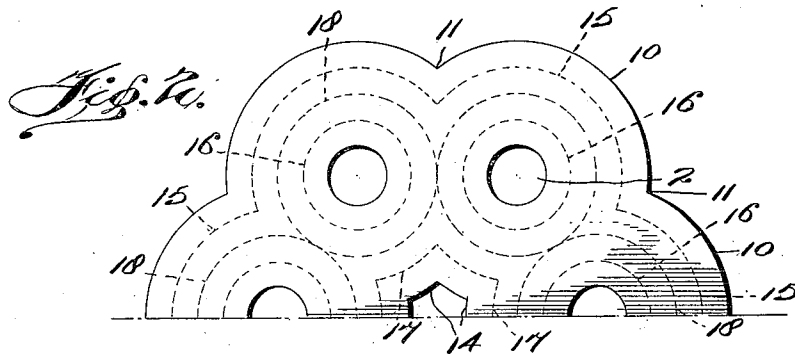
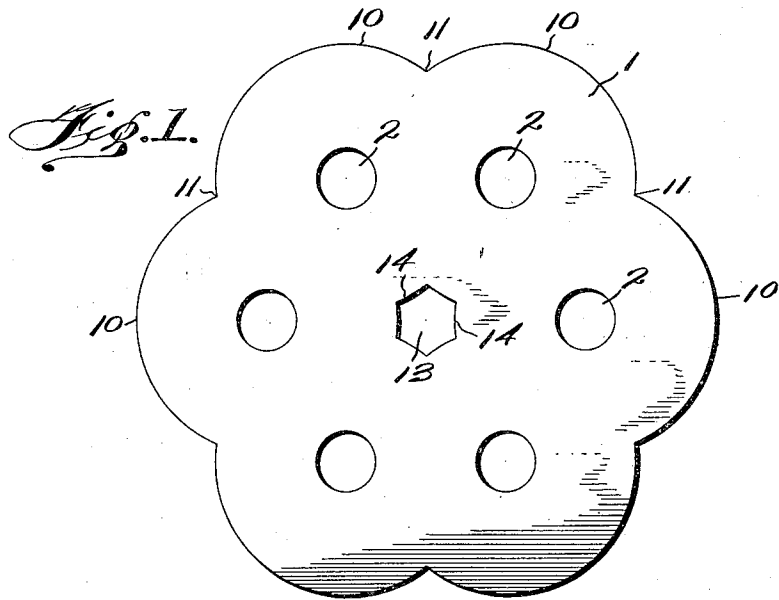


J. L. WALSH.
POWDER GRAIN.
APPLICATION FILED FEB. 20, 1913.

1,077,320.

Patented Nov. 4, 1913.



Witnesses
M. May, D. Wall
Edwin J. Bell.

Inventor.
James L. Walsh,
by Williamson, Dickinson
& McKee
Attorneys

UNITED STATES PATENT OFFICE.

JAMES L. WALSH, OF THE UNITED STATES ARMY.

POWDER-GRAIN.

1,077,320.

Specification of Letters Patent.

Patented Nov. 4, 1913.

Application filed February 29, 1913. Serial No. 749,695.

To all whom it may concern:

Be it known that I, JAMES L. WALSH, captain, U. S. Army, a citizen of the United States, at present stationed at War Department, Washington, District of Columbia, have invented certain new and useful Improvements in Powder-Grains; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to powder grains, and has for its object to produce a form for perforated grains of smokeless powder, which will secure a more complete combustion of the said grains in the gun than has been heretofore found possible.

To these ends, the invention consists in the novel details of construction of the grain more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views: Figure 1 is a diagrammatic end elevational view of a smokeless powder grain made in accordance with my invention; Fig. 2 is a view similar to Fig. 1, showing only half of the grain, and also illustrating by dotted lines just how the material of the grain will be consumed during combustion; and, Fig. 3 is a view also similar to Fig. 1 of a half of an old style powder grain, in order that its method of combustion may be compared with my new form of grain.

1 indicates a powder grain of any suitable composition, but preferably of the standard composition now employed by the government; 2 indicates the circular perforations now found in said grain, and 3 the central perforation also now employed in the old style of grain. The old style of grain is further provided with a circular outer surface 4, and, as is well known, when the material of the grain is ignited in the gun, the central perforation 3 will progressively burn outward until it becomes of say the size of the circle 5 in Fig. 3, while the perforations 2 will likewise extend concentrically until they are all say the size of the circles 6 in said figure. While this combustion is going on, the outer surface 4 will burn concentrically to itself inwardly until it becomes of say the size of the circle 7 in Fig. 3.

When the state of combustion thus described, has been reached in the old style of grain, there is left in the gun the slivers 8 and 9 of solid material, which are ignited on all sides, and which continue to burn on their respective faces. These said slivers, however, are independent pieces of material, they are blown by the powder gases forward, mixed up and jammed against each other, as well as against the moving projectile, and the evolution of gas from said slivers is necessarily not so regular in its increase of volume as was the case before these said slivers became separated from each other. The disadvantages resulting from this action of the slivers is well known to ordnance experts and need not be further discussed here. In order to overcome these said disadvantages and to prevent the formation of these said slivers, I have devised the following novel form of grain constituting my invention, and made the subject of this application, which will now be described as follows: Instead of providing a circular outer surface 4 in my grain, I break up the outer surface into segments, such as 10, each concentric with the surface of a perforation 2, and each segment meeting a companion segment along a line of intersection 11, as will be clear from Fig. 1. Further, instead of providing a circular central perforation 3, I provide the central hexagonal perforation 13 having a convexly curved side 14 for each perforation 2. Each convex surface 14 is further concentric with the surface of a perforation 2. With this new form of grain, when ignition occurs, the surfaces 10 will burn inward concentrically with themselves, as indicated by the dotted lines 15 in Fig. 2, and the perforations 2 will burn outwardly as before, as indicated by the dotted lines 16 in said figure. In the meantime, each convex surface 14 will burn outwardly, as indicated by the dotted lines 17 in said figure. It results from this that as the lines 16 and 15 approach each other, they will finally meet in the lines 18, and thereupon leave no slivers, such as 8, that were produced in the combustion of the old grain. Further, the lines 16 will also meet the extending lines or surfaces 17, as indicated by the lines 18, and consequently no slivers, such as 9, are formed in my grain. In other words, by the simple expedient of providing the curved surfaces 10 and 14, in

the old powder grain, I secure a practically complete combustion of the said grain before its particles disintegrate, and thereby avoid the objectionable slivers which are now
5 found in the present grain.

It is obvious that those skilled in the art may vary the details of construction, as well as the arrangement of the surfaces, without departing from the spirit of my invention,
10 and therefore, I do not wish to be limited to the above disclosure, except as may be required by the claims.

What I claim is:—

1. A powder grain provided with a plurality of intermediate perforations between
15 its center and circumference, with a central perforation having a portion of its wall substantially concentric with the wall of each of said intermediate perforations, and said
20 grain also having a portion of its outer circumference concentric with the wall of each

of said first mentioned perforations, substantially as described.

2. A substantially cylindrical smokeless powder grain having a plurality of intermediate perforations extending from end to
25 end of said grain, a central perforation extending parallel to said intermediate perforations throughout their length and having convex wall portions substantially con-
30 centric with the walls of said intermediate perforations, and said grain also having an outer circumference composed of convex surfaces substantially concentric with the
35 walls of said first mentioned perforations, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

JAMES L. WALSH.

Witnesses:

T. A. WITHERSPOON,
R. M. PARKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."